



Sika at Work

# Metsovitikos Bridge, EGNATIA Motorway, Greece



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## Metsovitikos bridge, EGNATIA Motorway

**Owner:** EGNATIA MOTORWAY

**Contractor:** AKTOR SA

**Start / Completion of Project:** October 2004 / December 2008

**Specifier:** DOMI O.E. & Lap GmbH

### Egnatia Project - Description

Egnatia Motorway extends from Igoumenitsa (Thesprotia prefecture) to Kipoi (Evros prefecture). The motorway has a total length of 670 km, serves in total 9 prefectures, connects with Albania, FYROM, Bulgaria and Turkey through 9 vertical axes and with the ports of Igoumenitsa, Thessaloniki, Kavala and Alexandroupoli, while passing through 30 areas of touristic and special interest.

On a national level, Egnatia Motorway will give the opportunity for complementary investments in the transportation sector (i.e. cargo centers), in the industrial and touristic sector and will form a basic growth driver for North Greece.

On a European level, Egnatia Motorway connects the industrial centres of East and West, while with its construction increases the possibilities for investments in transportations, industry and tourism.

In the whole length of Egnatia Motorway there are:

- 73 tunnels of total length ~ 49, 5 Km
- 529 long bridges of total length ~ 40 Km (and many smaller)
- 62 nodes of connection with the motorway
- 350 over and underpasses for entrance-exit
- 43 river passings
- 11 junctions with railway tracks

Due to the variety of the territorial topography through which Egnatia Motorway passes and taking into account the environmental conditions

that apply to the area, there was a strong demand to construct a large number of bridges, whose total length reached 42 Km (single branched). This means that 6% of the total length of the motorway consists of bridges, while the cost of their construction reflects 12% of the total expenditure to construct the Motorway.

### Metsovitikos Bridge

The section of Egnatia Motorway in Epirus is the most demanding technically, due to the especially difficult geomorphology of the area (the axis intersects perpendicular to the sierra of Pindos). One of the many technical projects is also the twin Bridge of Metsovitikos River that lies to the border of Metsovo area and connects the tunnels of Agios Nikolaos & Anilio.

Length: 537m (per branch)  
 Maximum height of piers: 110m  
 Maximum span: 235 m  
 Height from the river: ~ 150 m  
 Longitudinal slope  $i = 2, 60\%$

This bridge is one of the most difficult in technical aspect. During its specifying phase, it was given special emphasis in terms of aesthetics, so that it could fit harmonically to the unique natural beauty of the area.

### Project Demands

The size of the project, the very large central span, the especially difficult topographical morphology, the prevailing severe winters and the local gale winds were decisive problems that had to be dealt with.

The deck of the Metsovitikos Bridge was constructed with the cantilever method, while the piles with the method of rising moulds.

The high demands for quality and long term performance of the concrete, in conjunction with the difficult concreting conditions (large masses per casting, big heights & pumping distances, dense reinforcement, difficulties in compaction) resulted to increasing demands from the concrete mix design. These demands were many and in many cases conflicting, because the mix design had to offer at the same time:

- 90 minutes workability maintenance
- Fast setting, so that the mould could rise with the demanded speed (1 hr after casting)
- End of setting 7 hours after casting
- Constant cohesion when pumped 20-50 m horizontally and 100-120m vertically
- Air percentage 4-5%

### Sika Solution

Most possibly, the highest demand from the mix design was the prolonged slump maintenance during pumping through such a large piping network. Pumping in such a great height caused slump loss due to the developed friction and the temperature rise of the mix. The mix should exit the pipes, having the same consistence and workability as it had at the time of the start of the pumping process.

All these demands led to the creation of a high performance Tailor Made Product. The specific product could fulfill all demands, as it offered high range water reduction, high initial slump and prolonged maintenance, while helping to maintain the mix cohesive under these difficult casting conditions. All these properties that the product offered contributed positively to the whole casting process, while aimed to achieve the final designed strengths of concrete.

**Total concrete quantity:** ~ 40.000 m<sup>3</sup>

### Sika Products:

#### Concrete Production

Product	Description	Quantities (tn)
Sika® Viscocrete® 4000	New generation superplasticizer	300
SikaAer®	Air entrainer	6

